Sieve-tube Members in the Stem of Cyathea gigantea[1]

J. J. SHAH and R. L. FOTEDAR*

Cyathea gigantea (Wall. ex Hook.) Holtt. was collected from the Pachmarhi Hills, Madhya Pradesh, India, and was fixed in FAA or 4% formalin solution. After washing with 70% ethanol, the stem was dehydrated, infiltrated, and embedded by conventional methods (Sass, 1958). Sections 6-8 μm thick were stained with a combination of tannic acid, ferric chloride, and resorcin blue (Cheadle, Gifford & Esau, 1953). Mercuric bromphenol blue (Mazia, Brewer & Alfert, 1953) was used to confirm the presence of protein spherules in the sieve elements.

The sieve elements of vascular cryptogams have been defined as sieve cells because there are no specialized sieve areas at their end walls. In *Blechnum orientale* L. stems we have observed some sieve elements in which the pores in the sieve areas at the end walls were measurably larger than those found in the lateral wall sieve areas (unpublished).

In our investigation of phloem in the stem of *Cyathea gigantea* we have observed very large pores at the end walls of some sieve elements (*Figs. A–C*). The pores are either solitary (*Fig. C*) or in groups of two or three (*Fig. B*). The pores are lined with a variable amount of callose. They appear empty, but in some pores protein spherules and cytoplasmic lining can be seen. The pores vary from 2 μm to 5 μm in diameter. Sieve areas with such pores at the end walls can definitely be interpreted as sieve plates, and the sieve elements possessing them as sieve-tube members. In contrast to these pores, the lateral wall sieve area pores are minute, less than 0.8 μm in diameter, and are heavily lined or filled with callose (*Fig. D*). Other sieve elements have small pores at their end walls that are not different from those of the lateral wall sieve areas. These sieve elements are sieve cells.

As far as we know, no sieve plates have been reported in ferns. In *Equisetum* certain sieve elements have transverse or slightly oblique end walls that show considerably large pores. In 1961 Lamoureaux designated these as sieve plates and the cells sieve-tube members (cf. Esau, 1969, p. 365). We conclude that in the stem of *Cyathea gigantea* that we have studied, sieve cells and sieve-tube members are present.

LITERATURE CITED

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*Department of Botany, Sardar Patel University, Vallabh Vidyanagar 388 120, INDIA.

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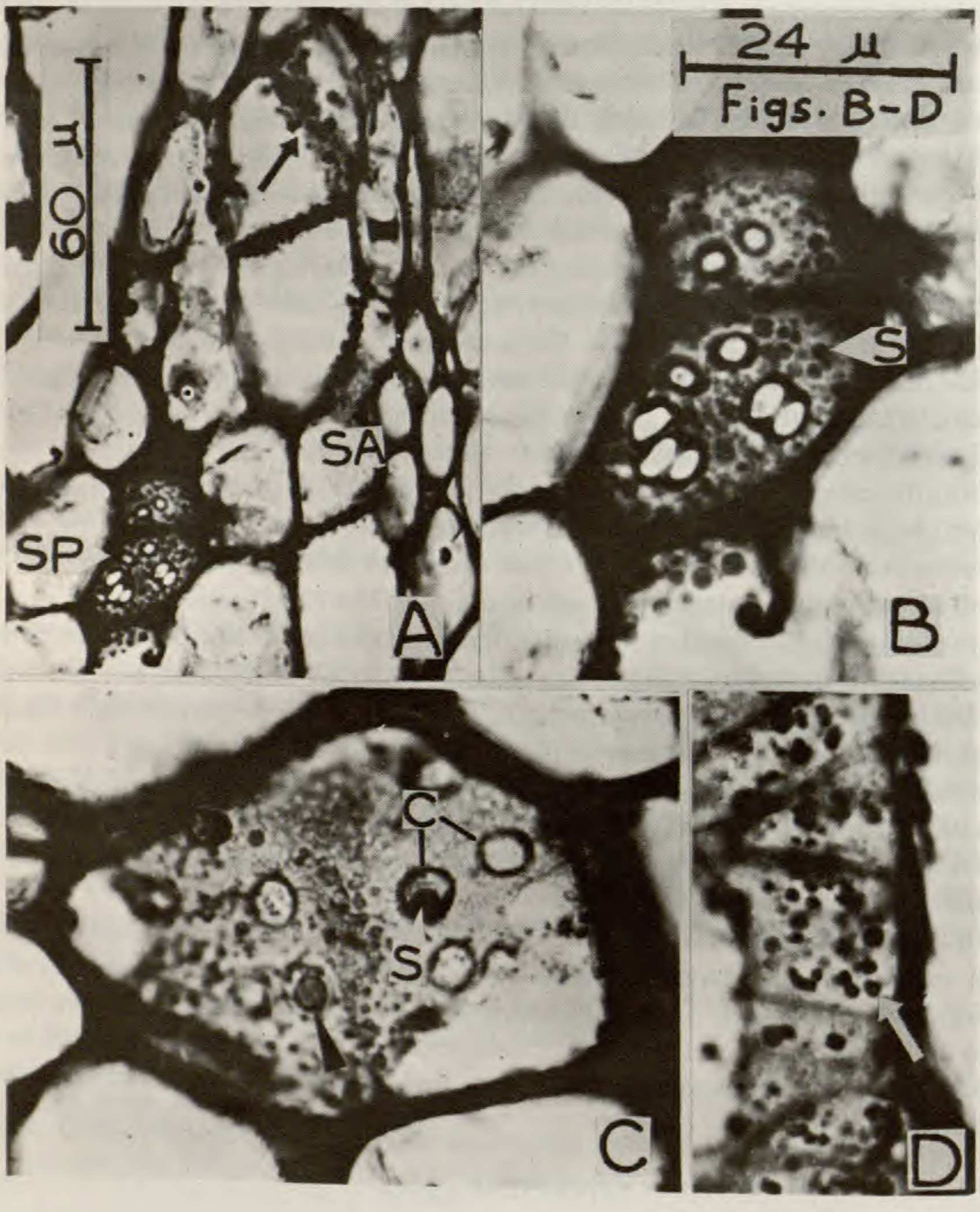

Phloem of *Cyathea gigantea*. FIG. A. Transection showing sieve plate in face view and sieve area in sectional view. Arrow indicates part of a sieve area at the oblique end wall having pores filled with callose. SA = sieve area; SP = sieve plate. FIG. B. Sieve plate in FIG. A, magnified. S = protein spherule. FIG. C. Transection of a sieve plate in face view. Black arrow indicates a protein spherule (in focus) lodged in the pore. C = callose; S = protein spherule. FIG. D. Longisection showing lateral wall sieve areas with callose-filled pores. Arrow indicates a pore heavily lined with callose.